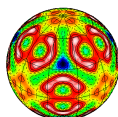
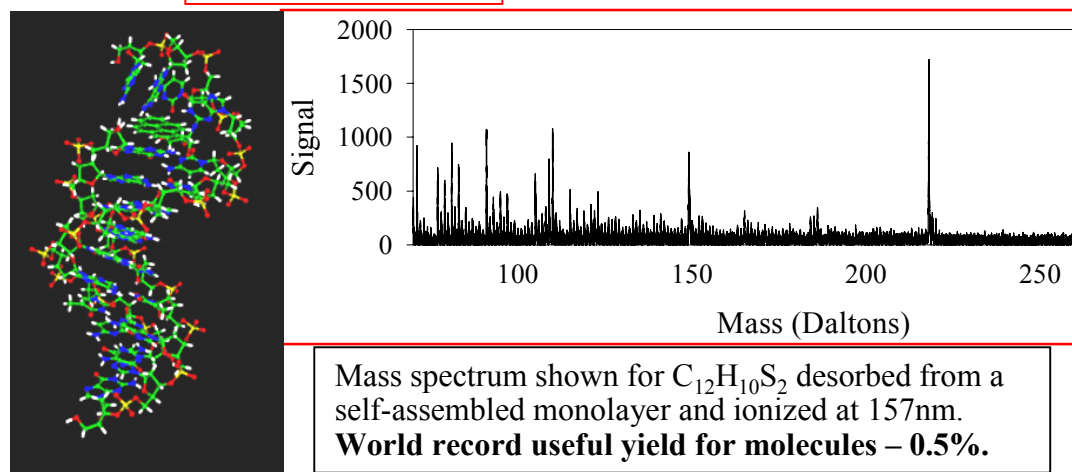
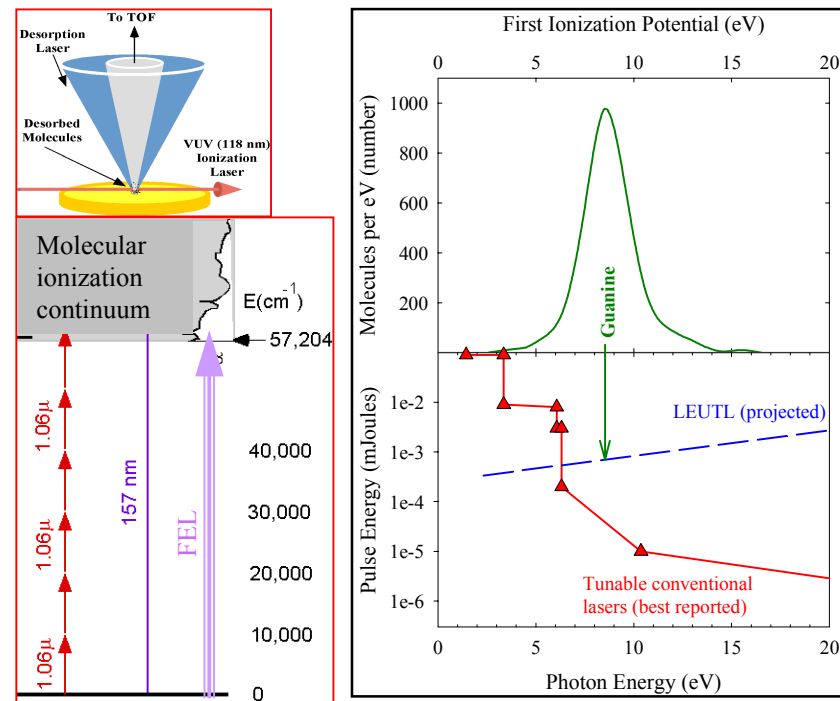


# Molecular Surface Analysis: Soft Ionization with Single Photons (58600)

- Surfaces of soft materials (polymers, biological matter, self assembled monolayers) are analyzed to determine their molecular components.
- This surface is first vaporized with a pulsed UV laser, then the desorbed molecules are ionized with a VUV laser. Molecular ions and fragments are then detected in a time-of-flight mass spectrometer.
- This approach ensures very high ‘useful yield’ when performed with our state of the art instruments. Trace levels of molecules in micron-sized volumes can be measured.
- Vacuum ultraviolet (VUV) lasers are needed to do single-photon ionization of most molecules (green curve, far right)
  - 157nm or 118nm laboratory lasers
  - Free-electron laser (broadly tunable, powerful)

**Single-photon ionization has been found to produce ‘soft’ ionization of most molecules. This results in:**

- Low fragmentation – simpler spectral interpretation.
- Strong molecular ion signal.
  - Trace molecule (e.g. DNA adduct) identification possible.
- High ionization cross section
- This methodology will enable trace level DNA adduct detection from small samples. Potential applications for this technique are abundant in fundamental cancer research, epidemiology and early detection of clinical cancer.



Basic Energy Sciences



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Surface Chemistry  
Group (58600)